IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	10/565,358	:	Examiner:	BABIC, Christopher M.
Filed:	November 20, 2006	:	TC/A U:	1637
Applicant:	HOSSAIN, Ashfaque, et al.	:	Confirmation No.:	5617
Docket No.:	501563.4	:	Customer No.:	61270

Title: RAPID NUCLEIC ACID ISOLATION METHOD AND COMPOSITIONS

Via EFS-Web

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION OF DR. NANCY DOHSE HANSON
PURSUANT TO 37 C.F.R. § 1.132

1. I am currently a professor at Creighton University School of Medicine with a primary appoint in the department of Medical Microbiology and Immunology with a secondary appointment in the department of Pediatrics. I have a bachelor of science in biology/chemistry, a masters of art in biology, and a doctorate in philosophy in medical microbiology. My CV is attached to this declaration for review.

2. I am an author or co-author of many publications in peer-reviewed journals. I teach several classes and have presented various presentations on various subjects. I have worked with medical research students and conducted research at Creighton University and University of Nebraska. These specifics and my additional honors, professional activities and achievements are listed in my attached CV.

3. This Declaration is being presented by me in furtherance of the prosecution of the above-referenced application.

4. I have reviewed the above-referenced application in detail as well as Cook et al. (J. Clin Microbiol. 2000 Dec.; 38(12):4326-31) ("Cook") in view of Chomcynski (U.S. Pat. No. 5,345,994) ("Chomcynski") and in further view of Majumdar (Biotechniques. 1991 Jul.; 11(1):94-101) ("Majumdar") provided by the Examiner which have been cited during prosecution. I have compared the method presented in the cited references to the method of the invention disclosed and now claimed in the present application, herein referred to as "Hossain." After reviewing these references, it is my firm conviction that these references do not render the claimed invention obvious.

5. The method of the invention of the above-referenced patent application has been licensed and sold under the Invitrogen brand. These sales have been ongoing since 2005. During this timeframe, the licensee has had approximately Three Hundred Sixty Thousand Dollars of net profits and paid to Applicant over Eighteen Thousand Dollars in royalties. The specific range of microliters for the admixture for the method of isolating RNA from a biological specimen disclosed by the present application is why the present invention is so successful. The method of the present invention provides superior results and amounts of RNA. Specifically, this method works well for all types of bacteria. Once the licensee adopted this method of isolating RNA, the licensee has become even more successful. The claimed features of the present invention directly led to this commercial success.

6. The claimed invention solves a long-felt need in the industry and is superior to RNA extraction methods with respect to bacterial RNA. Although there are many different methods for isolating RNA, the RNA isolated was poor in quality, contaminated, was a slow process or all of the above. The methods and compositions of the present invention permit the easy preparation of highly pure RNA samples from clinical bacterial isolates with a minimum amount

of contaminating genomic DNA. It is clear that a long-felt need arose for isolating RNA in a purer form from bacterial cells, in a more economical way and more quickly. Further, others have been unable to solve this need. However, the claimed invention was able to meet this need and succeed where others had failed because of the specific admixture of from about 750 to about 1000 microliters of mono-phasic solution of phenol and guanidine isothiocyanate and from about 100 to about 300 microliters of lysis buffer. Thus, the claimed invention addressed this long-felt need and succeeded where others had failed before.

7. There is nothing in the cited references themselves or in the knowledge generally available to a person of ordinary skill in the art that would lead one of ordinary skill in the art to combine Cook, Chomcynski and Majumdar.

8. Catrimox is a cationic surfactant used for lysing blood cells. Cook states that it added a lysis solution but the specifics of that solution are not given nor are they provided in the articles cited within the methodology when described. As previously pointed out, the prior art of record relates to RNA extraction from whole blood, whereas Hossain is related to RNA extraction from a bacterium sample. With regards to lysing whole blood cells, these types of cells are more fragile than bacterial cells and the hypotonic solution used would not be appropriate for bacterial cells as bacterial cells have a cell wall in addition to one membrane (Gram-positive bacteria) or two membranes for Gram-negatives. It would not have been common practice to assume that the methodology taught by Cook alone or in combination with the other cited references would work for bacteria.

9. Majumdar teaches simultaneous RNA and DNA extraction for eukaryotic and bacterial samples. Majumdar isolates both DNA and RNA from the same sample. RNA expression using this method of RNA isolation would surely be contaminated with DNA and thus unusable for the

method disclosed by Hossain. In addition, Majumdar teaches the use of Triton-X whereas Hossain et al. teach the use of sodium dodecyl sulfate.

10. Accordingly, it is my opinion that the present invention is unique and not obvious based upon my experience in the laboratory and in view of the unsolved and long-felt need in the industry, the commercial success of the method of the above-referenced application, and the cited references.

11. I declare that all statements made herein are of my own knowledge are true and all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful, false statements and the like are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and such willful, false statements may jeopardize the validity of any patents issued from the patent application.

4-19-2011
Date

Nancy Dohse Hanson

Curriculum Vitae

of

Nancy Dohse Hanson
Creighton University School of Medicine
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Center for Research in Anti-Infectives & Biotechnology
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Omaha, Nebraska 68178-0213

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EDUCATION/TRAINING

1985-1991 **Doctor of Philosophy, Medical Microbiology**
Cellular and NS1 Dependent Regulation of Early Gene Expression in the Parvoviruses LuIII and H-1
UNIVERSITY OF NEBRASKA MEDICAL CENTER
Omaha, Nebraska

1982-1984 **Masters of Art in Biology**
Membrane Protein Variation in *Dictyostelium mucoroides* during Development along Alternative Pathways
UNIVERSITY OF NEBRASKA - OMAHA
Omaha, Nebraska

1974-1979 **Bachelor of Science in Biology/Chemistry**
UNIVERSITY OF TEXAS - PERMIAN BASIN
Odessa, Texas

PROFESSIONAL APPOINTMENTS

2009-Present **Professor: Creighton University School of Medicine**
Primary Appointment: Department of Medical Microbiology and Immunology
Secondary Appointment: Department of Pediatrics

2003-Present **Associate Professor (Tenured): Creighton University School of Medicine**
Primary Appointment: Department of Medical Microbiology and Immunology
Secondary Appointment: Department of Pediatrics

2001-2003 **Assistant Professor: Creighton University School of Medicine**
Primary Appointment: Department of Medical Microbiology and Immunology
Secondary Appointment: Department of Pediatrics

1999-Present	**Director of Molecular Biology** Center for Research in Anti-Infectives and Biotechnology Creighton University School of Medicine
1995-2001	**Assistant Professor: Creighton University School of Medicine** **Primary Appointment**: Department of Pediatrics **Secondary Appointment**: Department of Medical Microbiology and Immunology
1994-1995	**Research Associate** Department of Veterinary Science University of Nebraska-Lincoln Lincoln, Nebraska
1992-1994	**Postdoctoral Research Associate** Department of Veterinary Science University of Nebraska-Lincoln Lincoln, Nebraska
1985-1991	**Ph.D. Graduate Research Assistant** Eppley Institute University of Nebraska Medical Center Omaha, Nebraska
1982-1984	**MA Graduate Teaching Assistant** Biology Department University of Nebraska-Omaha Omaha, Nebraska
1980-1981	**High School Science Teacher Grades 7-12** Waterloo Public Schools Waterloo, Nebraska
1979-1980	**High School Science Teacher, Biology and Ecology** Odessa High School Odessa, Texas

HONORS AND OTHER PROFESSIONAL ACTIVITIES

1. Invited Guest Editor for the journal Current Pharmaceutical Design. The title of the issue will be **"Resistance in Gram-negative Pathogens: A Threat to Global Health". Tentative date of Issue, May 2010.**
2. American Academy of Microbiology colloquium on **"Global Antibiotic Resistance: New Approaches to an Old Problem."** Appointed member of the steering committee Annecy France, October 2008.
3. **Researcher of the Year**: Nebraska Cystic Fibrosis Foundation. 2007.
4. Invited Plenary Lecturer for the Australian Society of Microbiology, Gold Coast, Brisbane, Australia. July, 2006.
5. Mentor of an International Fulbright Scholar from Nigeria. October 1, 2007-June 30, 2008.
6. Mentor of an International Fulbright Scholar from Cairo, Egypt; October 1, 2006-March 1, 2007.
7. Mentor of a minority NIH grant recipient from Puerto Rico; January 1, 2007-June 30, 2008.
8. Adjunct Professor, University of Puerto Rico, Medical Science Campus. San Juan, Puerto Rico. Affective August 8, 2004.
9. Recipient of a one month travel award for the promotion of research to the University of Queensland, Brisbane Australia, July 2004.
10. National Institutes of Health Study Section. Innovative Research Topics in Virology, ZRG1 IDM-G (90). March 2004.
11. National Institutes of Health Study Section. Innovative Research Topics in Virology, ZRG1 IDM-G (02). June 2004.
12. National Institutes of Health Study Section. Small Business:Non-HIV Anti-infective Therapeutics. ZRG1 IDM-Q (10) "Bugs and Drugs". June 2007.
13. National Institutes of Health Study Section. Small Business:Non-HIV Anti-infective Therapeutics. ZRG1 IDM-Q (10) "Bugs and Drugs". November 2007.
14. Wellcome Trust: Adhoc grant reviewer
15. Member of the Dublin Molecular Medicine Center; a worldwide collaboration in research and teaching, Dublin, Ireland.
16. Editorial Board: Journal Antimicrobial Chemotherapy January 2007-December 2010.
17. Editorial Board: clinical Microbiological Reviews, January 2009-December 2011.
18. External Reviewer: Antimicrobial Agents and Chemotherapy
19. External Reviewer: Diagnostic Microbiology and Infectious Diseases
20. External Reviewer: Clinical Infectious Disease
21. External Reviewer: Pediatric Infectious Disease Journal
22. External Reviewer: Journal Antimicrobial Chemotherapy
23. External Reviewer: Clinical Microbiology and Infection
24. External Reviewer: Emerging Infectious Disease
25. External Reviewer: Journal Clinical Microbiology
26. External Reviewer: FEMS Microbiological Letters
27. External Reviewer: Clinical Chemistry
28. External Reviewer: Applied and Environmental Microbiology
29. External Reviewer: Journal of Bacteriology
30. Book Review (2001). "Bacteria versus Antibacterial Agents: An Integrated approach
31. Councilor Missouri Valley Branch, ASM 2003-2005
32. President Missouri Valley Branch, ASM, 2001-2003.

33. President-elect Missouri Valley Branch, ASM, 1999-2001.
34. Health Future Foundation Faculty Development Award: 1996 and 1999.
35. Presidential Fellowship, 1990-1991, University of Nebraska.
36. Ph.D. stipend supported as a recipient of a Biotechnology Research Assistantship: 1989-1990 and 1988-1989.

CURRENT MEMBERSHIPS

1. American Society for Microbiology

RESEARCH

CURRENT RESEARCH ACTIVITIES

1. Molecular mechanisms involved in KPC-mediated resistance.
2. Regulation of chromosomal *amp*C gene expression in *Serratia*, *Citrobacter*, and *Enterobacter*.
3. Regulation of plasmid-mediated *amp*C gene expression in Gram-negative organisms.
4. Regulation of efflux expression and its correlation with resistance in *Pseudomonas aeruginosa.*
5. Evolution and mechanisms of microbial resistance in cystic fibrosis patients.
6. Development of family-specific PCR primers for the detection of β-lactamase genes.
7. Molecular diagnostics of resistance genes from clinical isolates.

BIBLIOGRAPHY

Invited Review Articles (Peer-Reviewed)

1. **Hanson, N. D**. 2010. Molecular Diagnostics Could Help in Coping with Hidden β-Lactamases. Microbe. 5:333-339.
2. Lister, P. D., D. J. Wolter and **N. D. Hanson**. 2009. Antibaterial-resistant Pseudomonas aeruginosa: Clinical impact and complex regulation of chromosomally encoded resistance mechanisms. Clin. Microbiol. Rev. 22:582-610.
3. **Hanson, Nancy D**. 2003. AmpC β-lactamases: What do we need to know for the future? Journal of Antimicrobial Chemotherapy. **52**:2-4.
4. **Hanson, N.D.** and C.C. Sanders. 1999. Regulation of Inducible AmpC Beta-Lactamase Expression Among Enterobacteriaceae. Current Pharmaceutical Design. **5**: 881-894.

PUBLICATIONS: Manuscripts in Peer-Reviewed Journal

5. Borgianni L, S. Prandi, L. Salden, G. Santella, **N.D. Hanson**, G.M. Rossolini, and J.D. Docquier. 2011. Genetic context and biochemical characterization of the IMP-18 metallo-beta-lactamase identified in a *Pseudomonas aeruginosa* isolate from the United States. Antimicrob Agents Chemother. 55:140-5.
6. Munier, G. K, C. L. Johnson, J. W. Snyder, E. S. Moland, **N.D. Hanson**, and K. S. Thomson. 2010. Positive extended-spectrum-beta-lactamase (ESBL) screening results may be due to AmpC beta-lactamases more often than to ESBLs. J. Clin. Microbiol. 48:673-674.
7. AbdelGhani S. M., E. S. Moland, J. A. Black, **N. D. Hanson**, R. V. Goering, M. A. Amine, A. E. Saafan, M. Gaafar, M. Younan, and K. S. Thomson. 2009. First report of CTX-M-14 producing isolates of Salmonella serovar Typhimurium from Egypt. J. Infect. Dev. Ctries. 4:58-60.

8. Khalaf, N. G., M.M. Eletreby, and **N. D. Hanson**. 2009. Characterization of CTX-M ESBLs in *Enterobacter cloacae*, *Escherichia coli* and *Klebsiella pneumoniae* clinical isolates from Cairo, Egypt. BMC Infectious Disease 9:84-87.
9. Wolter, D.J., J.A. Black, P.D. Lister, **N.D. Hanson**. 2009. Multiple genotypic changes in hypersusceptible strains of *Pseudomonas aeruginosa* isolated from cystic fibrosis patients do not always correlate with the phenotype. J. Antimicrobial Chemotherapy. 64:294-300.
10. Wolter, D.J. N. Khalaf, I. E. Robledo, G. Vazquez, M. I. Sante, E. E. Aquino, R. Goering, and **N.D. Hanson**. 2009. Surveillance of carbapenem-Resistant *Pseudomonas aeruginosa* Isolates from Puerto Rican Medial Center Hospitals: Dissemination of KPC and IMP-18 β-Lactamases. Antimicrobial Agents and Chemotherapy. 53:1660-1664.
11. Wolter, D.J., P. M. Kurpiel, N. Woodford, M-F. I. Palepou, R. V. Goering, and **N. D. Hanson**. 2009. Phenotypic and Enzymatic Comparative Analysis between the Novel KPC variant, KPC-5, and Its Evolutionary Variants, KPC-2 and KPC-4. Antimicrobial Agents and Chemotherapy. 53:557-62.
12. Schmidtke, A. J. and **N. D. Hanson**. 2008. The Role *amp*D Homologs Play in the Overproduction of AmpC in Clinical Isolates of Pseudomonas aeruginosa. Antimicrobial Agents and Chemotherapy. 52:3922-3927.
13. **Hanson, N. D.**, E. S. Moland, S G. Hong, K. Propst, D. Novak, and S. J. Cavalieri. 2008 Surveillance of community-based reservoirs real the co-production of a CMY-2 AmpC β-lactamase and a CTX-M-14 extended spectrum β-lactamase in isolates of *Klebsiella pneumoniae* and *Escherichia coli*. Antimicrobial Agents and Chemotherapy. 52:3814-3815
14. Wolter, D.J., D. Acquazzino, R.V. Goering, P. Sammut, N. Khalaf, and **N. D. Hanson**. 2008. Emergence of carbapenem resistance in Pseudomonas aeruginosa isolates from a patient with cystic fibrosis in the absence of carbapenem therapy. Clinical Infectious Disease. 46: e137-141
15. Wolter, D.J, A.J. Schmidtke, **N.D. Hanson**, and P.D. Lister. 2007. Increased expression of *amp*C in *Pseudomonas aeruginosa* mutants selected with ciprofloxacin. Antimicrobial Agents and Chemotherapy. 51:2997-3000.
16. Sidjabat H.E., **N.D. Hanson**, E.S. Moland, J.M. Bell, J.S. Gibson, L.J. Filippich, and D.J. Trott. 2007. Identification of plasmid-mediated extended-spectrum and AmpC beta-lactamases in Enterobacter spp. isolated from dogs. J. Medical Microbiology. 56:426-434.
17. Moland, E.S., S. G. Hong, K. S. Thomson, D. H. Larone, and **N.D. Hanson**. 2007. *Klebsiella pneumoniae* isolate producing at least eight different β-lactamases, including AmpC and KPC β-lactamases. Antimicrobial Agents and Chemotherapy. 51:800-801.
18. Hong, S. G, E. S. Moland, P.A. Wickman, J.A. Black, A. Hossain, **N. D. Hanson**, and K.S Thomson. 2007. In vitro studies with DQ-113 and comparison fluoroquinolones to determine propensities to selected resistance in gram-positive cocci. Antimicrobial Agents and Chemotherapy. 51:1512-1514.
19. Sidjabat, H.E., K.M. Townsend, M. Lorentzen, K.S. Gobius, N. Fegan, J.J. Chin, K.A. Bettelheim, **N.D. Hanson**, Bensink J. C., and D. J. Trott. 2006. Emergence and spread of two distinct clonal groups of multidrug-resistant Escherichia coli in a veterinary teaching hospital in Australia. J. Medical Microbiology. **44**:3318-3324.
20. Wickman, P.A., J.A. Black, E.S. Moland, K. S. Thomson, and **N.D. Hanson**. 2006. In vitro development of resistance to DX-619 and other quinolones in enterococci. J. Antimicrobial Chemotherapy. **58**:1268-1273.
21. Moland, E.S., **N. D. Hanson**, J. A. Black, H. Hossain, W. Song, and K. S. Thomson. 2006. Prevalence of newer β-lactamases in Gram-negative clinical isolates collected in the United States from 2001-2002. J. Clinical Microbiology. **44**:3318-3324.

22. **Hanson, N. D.**, A. Hossain, L. Buck, E. S. Moland, and K.S. Thomson. 2006. The First Occurrence of a *Pseudomonas aeruginosa* in the United States Producing an IMP Metallo-β-lactamase, IMP-18. Antimicrobial Agents and Chemotherapy **50**:2272-2273.
23. Schmidtke, A. J. and **N. D. Hanson**. 2006. A Model System to Evaluate the Effect of *amp*D Mutations on AmpC-mediated β-lactam Resistance. Antimicrobial Agents and Chemotherapy. **50**:2030-2037.
24. Sidjabat H. E., K. M. Townsend, **N. D. Hanson**, J. M. Bell, H. W. Stokes, K. S. Gobius, S. M. Moss, and D. J. Trott. 2006. Identification of bla_{CMY-7} and associated plasmid-mediated resistance genes in multidrug-resistant *Escherichia coli* isolated from dogs at a veterinary teaching hospital in Australia. J. Antimicrobial Chemotherapy. **57**:840-848.
25. Wolter, D.J., **N.D. Hanson**, and P.D.Lister. 2005. AmpC and OprD are not involved in the mechanism of imipenem hypersusceptibility among *Pseudominas aeruginosa* isolates overexpressing the *mex*CD-*opr*J efflux pump. Antimicrobial Agents and Chemotherapy. 49:4763-4766.
26. Mortensen, J.E., M. Bemier, L.D. Gray, S. Dolan, **N.D. Hanson**, E.S. Moland, B. Abdalhamid. 2005. New quality control strain for use in routine testing for production of extended-spectrum Beta-lactamases by Enterobacteriaceae. J Clin Microbiol. 43 (5):2545.
27. Hong, T. E.S. Moland, B. Abdalhamid, **N.D. Hanson**, J. Wang, C. Sloan, D.Fabian, A. Farajallah, J.Levine, and K.S. Thomosn. 2005. *Escherichia coli*: development of carbapenem resistance during therapy. Clin Infect Dis. 2005 15;40(10):e84-6.
28. Song W, E. S. Moland, **N.D. Hanson**, J. S. Lewis, J. H. Jorgensen, and K. S. Thomson. 2005. Failure of cefepime therapy in treatment of Klebsiella pneumoniae bacteremia. J. Clinical Microbiology 43:4891-4904.
29. Pitout, J. D.D., A. Hossain, and **N.D. Hanson**. 2004. Phenotypic and molecular detection of CTX-M-β-lactamases produced by *Escherichia coli* and *Klebsiella* spp. Journal of Clinical Microbiology. 42:5715-5721.
30. Reisbig, M.D. and **N. D. Hanson**. 2004. Promoter sequences necessary for high level expression of the plasmid-associated *amp*C β-lactamase gene, bla_{MIR-1}. Antimicrobial Agents and Chemotherapy. 48:4177-4182.
31. Abdalhamid, B., J. D. D. Pitout, and **N. D. Hanson**. 2004. Community Onset Disease Caused by *Citrobacter freundii* Producing A Novel CTX-M β-lactamase, CTX-M-30, in Canada. Antimicrobial Agents and Chemotherapy. Antimicrobial Agents and Chemotherapy. 48:4435-4437.
32. Hossain, A, Ferraro, M. J., Pino. R. M.[3], Dew, R. B. III, Moland, E.S., Lockhart, T. J., Thomson, K. S. Goering, R. V. and **Hanson, N.D**. 2004. Plasmid-mediated carbapenem hydrolyzing enzyme, KPC-2, in an *Enterobacter sp.* Antimicrobial Agents and Chemotherapy 48:4438-4440.
33. Hossain, A., M.D. Reisbig, and **N.D. Hanson**. 2004. Plasmid-encoded functions compensate for the biological cost of AmpC over-expression in a clinical isolate of *Salmonella typhimurium*. Journal of Antimicrobial Chemotherapy. **53**:964-970
34. Liebana, E., M. Batchelor, C. Torres, L. Brinas, L.A. Lagos, B. Abdalhamid, **N. D. Hanson**, J. Martinez-Urtaza. 2004. Pediatric Infection due to multi-resistant Salmonella enterica Serotype Infantis in Honduras. Journal of Clinical Microbiology. **42**:4885-4888.
35. Pitout, J.D.D., **N.D. Hanson**, D. L. Church, and K. B. Laupland. 2004. Population-based laboratory Surveillance for *Escherichia coli*-producing extended-spectrum β-lactamases: importance of community isolates with bla_{CTX-M} genes. Clinical Infectious Disease 38:1736-1741.

36. Wolter, D., **N.D. Hanson**, P.D. Lister. 2004. Insertional inactivation of *opr*D in clinical isolates of *Pseudomonas aeruginosa* leading to carbapenem resistance. FEMS Microbiology Letters. **236**:43-50.
37. Wolter D. J., E. Smith-Moland, R. V. Goering, **N. D. Hanson**, and P.D. Lister. **2004.** Multidrug resistance associated with *mex*XY expression in clinical isolates of *Pseudomonas aeruginosa* from a Texas hospital. Diagn Microbiol Infect Dis. 2004 50:43-50.
38. Liebana, E., M. Gibbs, C. Clouting, L. Barker, F. Glifton-Hadley, E. Pleydell, B. Abdalhamid, **N. D. Hanson**, L. Martin, C. Poppe, R. Davies. 2004. Characterization of beta-lactamases responsible for resistance to extended-spectrum cephalosporins in *Escherichia coli* and *Salmonella enterica* strains from food-producing animals in United Kingdom. *In Press*: Microbial Drug Resistance **10**:1-9.
39. Pitout, J.D., M.D. Reisbig, L. Chui, M. Louie, L. Crowe, D. L. Church, S. Elsayed, D. Gregson, R. Ahmed, G. Soule, P. Tilley, and **N. D. Hanson**. 2003. Association between the handling of pet treats and infection with *Salmonella enterica* serotype Newport expressing the AmpC β-lactamase, CMY-2. J. Clinical Microbiology. **41**:4578-4582.
40. Pitout, J. D. D., M. D. Reisbig, E. C. Vennter, D. L. Church, and **N. D. Hanson**. 2003. Modification of the double-disk test for the detection of Enterobacteriaceae producing extended-spectrum (ESBLs) and AmpC β-Lactamases. Journal Clinical Microbiology. **41**:3933-3935.
41. Moland, E.S, S. Pottumarthy, J. A. Black, A. Hossain, **N. D. Hanson**, and K. S. Thomson. 2003. Discovery of CTX-M-like ESBLs in *E. coli* Isolates from Five States in the USA. Antimicrobial Agents and Chemothreapy. **47**:2382-2383
42. Reisbig, M.D., A. Hossain, and **N.D. Hanson .** 2003. Factors Influencing Gene Expression and Resistance for Gram-Negative Organisms Expressing Plasmid-Encoded *amp*C genes of Enterobacter Origin. J. Antimicrobial Chemotherapy. **51**:1141-1151.
43. Coudron, P.E., **N. D. Hanson**, and M. W. and Climo. 2003. Occurrence of Extended-Spectrum and AmpC Beta-Lactamases in Bloodstream Isolates of Beta-*Klebsiella pneumoniae*: Isolates Harbor Plasmid-mediated FOX-5 and ACT-1 AmpC Lactamases. J. Clinical Microbiology. **41**:772-777
44. Mahlen, S. D., S. Morrow, B. Abdalhamid, and **N.D. Hanson**. 2003. Analyses of the *amp*C Gene Expression in *Serratia marcescens* Reveal New Regulatory Properties. J. Antimicrobial Chemotherapy. **51**:791-802.
45. Moland, E.S., **N. D. Hanson**, V. L. Herrera, J. A. Black, T. J. Lockhart, A. Hossain, J.A. Johnson, R. V. Goering, and K. S. Thomson. 2003. Plasmid-mediated, carbapenem-hydrolysing β-lactamase, KPC-2, in *Klebsiella pneumoniae* isolates. J. Antimicrobial Chemotherapy. **51**:711-714.
46. Perez-Perez, F. J. and **N.D.Hanson**. 2002. Detection of Plasmid-Mediated AmpC β-Lactamase Genes in Clinical Isolates by Using Multiplex PCR. J. Clinical Microbiol. **40**:2153-2162.
47. **Hanson,N.D.**, E.S. Moland, A. Hossian, S.A. Neville, I.B. Gosbell, and K.S. Thomson. 2002. Unusual *Salmonella enterica* serotype Typhimurium isolate producing CMY-7, SHV-9, and OXA-30 β-lactamases. J. Antimicrob. Chemother. 49:1011-1014.
48. Riesbig, M.D. and **N. D. Hanson**. 2002. The ACT-1 Plasmid-Mediated AmpC β-lactamase is Inducible: Detection in a complicated β-lactamase Background. J. Antimicrobial Chemotherapy 49:557-560.
49. Moland, E.S, J. A. Black, J. Ourada, M. D. Reisbig, **N. D. Hanson**, and K. S. Thomson. 2002. Occurrence of Newer β-lactamases in *Klebsiella pneumoniae* Isolates from 23 United States Hospitals. Antimicrobial Agents and Chemotherapy. 46:3837-3842.

50. **Hanson, N.D.**, Moland, E.S., and Pitout, J.D.D. 2001. Enzymatic characterization of TEM-63, a TEM-type extended spectrum β-lactamase expressed in three different genera of Enterobacteriaceae from South Africa. Diagn. Microbiol. Infect. Dis. **40**:199-201.
51. **Hanson, N.D.**, Thomson, K.S., Moland, E.S., Sanders, C.C., Berthold, G. and Penn, R. 1999.Molecular Characterization of a Multiply Resistant *Klebsiella pneumoniae* Encoding ESBLs and a Plasmid-mediated AmpC J. Antimicrobiol. Chemother. **44**:377-380.
52. Pitout, J.D.D., Thomson, K.S., **Hanson, N.D.**, Ehrhardt, A.F., Moland, E.S., Sanders, C.C. 1998. ß-lactamases Responsible for Resistance to Expanded-spectrum Cephalosporins among *Klebsiella pneumoniae*, *Escherichia coli* and *Proteus mirabilis* Isolates Recovered in South Africa. Antimicrob. Agents Chemother. 42:1350-1354.
53. Pitout, J.D.D., Thomson, K.S., **Hanson, N.D.**, Ehrhardt, A.F., Coudron, P, Sanders, C.C. 1998. Plasmid-mediated resistance to expanded-spectrum cephalosporins among *Enterobacter aerogenes*. Antimicrob. Agents Chemother. 42:596-600.
54. **Hanson, N.D,** Henderson, G. and Jones, C. 1994. The herpes simplex virus type 2 gene which encodes the large subunit of ribonucleotide reductase has unusual regulatory properties. Virus Research. 34:265-80.
55. Bratanich, A.C. **Hanson, N.D.** and Jones, C.J. 1992. The latency related gene of bovine herpes virus 1 inhibits the activity of immediate early transcription unit 1. Virology 191:988-991.
56. **Hanson, N.D.** and Rhode III, S.L. 1991. Parvovirus NS1 Stimulates P4 expression by Interaction with Terminal Repeats and through DNA Amplification. J. Virol. 65:4325-33.
57. **Hanson, N.D.** and Weber, A.T. 1987. Membrane Protein Variation in *Dictyostelium mucoroides* during Sorocarp and Macrocyst Development. Exp. Mycol. 11:354-59.

Invited Speaker

International

1. **Australian Society for Microbiology (National Meeting)**: Plenary Lecture: Title: The role of gene expression in Gram-negative Resistance: The AmpC Story. July 2006.
2. **Australian Society for Microbiology (National Meeting)**: Symposium Speaker: Title: Molecular Detection of ESBLs and AmpC Resistance: Is it time? July 2006.
3. **Australian Society for Microbiology (National Meeting):** Workshop Presenter: Title: Molecular Approaches to ESBL and AmpC Detection. July 2006.
4. **Society for General Microbiology**, Edinburgh, Scotland. Symposium Lecture April 2005. Title: Molecular Mechanisms of AmpC Gene Expression and the Clinical Implications Associated with Gram-negative Pathogens.
5. **Australian Society of Microbiology Antimicrobial Meeting, Queensland Regional Meeting. Morton Bay Research Facility, North Stradbroke Island, Brisbane Australia.** July 2004. World Wide Emergence of Beta-lactam Resistance: The Need for Molecular Diagnostics.
6. **University of Queensland, Brisbane, Australia: Department of Veterinary Science**. July 2004. The Molecular Mechanisms Involved in AmpC-Mediated Resistance: A Complex Process.
7. **Australian Society of Microbiology Antimicrobial Meeting, Grand Rounds: Women's and Children's Hospital, Adelaide, Australia**: July 2004. ESBLs and AmpCs: What's the Difference?

8. **Australian Society of Microbiology Antimicrobial Meeting, Grand Rounds: Concord Hospital, Sydney Australia:** July 2004. ESBLs and Plasmid-mediated AmpC in Gram-Negative Bacteria- What are the differences?
9. **Puerto Rico Veterans Administration Hospital: Infectious Disease Fellows**: February 2004. World Wide Emergence of β-lactam and Fluoroquinolone Resistance: The Need for Molecular Diagnostics.
10. **University of Puerto Rico, Department of Microbiology and Medical Zoology Graduate Seminar:** February 2004. The Complexities of Molecular Mechanisms Involved in AmpC-Mediated Resistance.
11. **University of Puerto Rico School of Medicine: Grand Rounds.** February 2004. World Wide Emergence of β-lactam and Fluoroquinolone Resistance: The Need for Molecular Diagnostics.
12. **Irish Society of Clinical Microbiology:** Dublin Ireland. June 2002. **Keynote Speaker** " ESBLs and AmpC β-lactamases: What's the Difference?
13. **University of Dublin, Trinity College, Ireland**: November 2000. Annual molecular medicine symposium, **Keynote speaker microbial genetics**. Title: " The regulation of AmpC β-lactamase expression in Enterobacteriaceae."
14. **St Jame's Hospital, Dublin Ireland**. November 2000. Research seminar. Title: "The regulation of AmpC β-lactamase expression in Enterobacteriaceae and its relationship to resistance."
15. **Department of Medical Microbiology, Medical School of Edinburgh, Scotland**. November 2000. Title: "The regulation of AmpC β-lactamase expression in Enterobacteriaceae and its relationship to resistance."

National

1. 110th American Society of Microbiology. Symposium Speaker, San Diego, CA, USA. May 2010. Hidden β-lactamases: Molecular Strategies for Detection.

2. Eastern Pennsylvania American Society of Microbiology Annual Symposium. Symposium Speaker, Philidelphia, PA. USA. November 2009. Hidden β-lactamases: The Need for Molecular Diagnostics

3. 109th American Society of Microbiology. Symposium Speaker: Philadelphia PA, USA. May 2009. Hidden β-lactamases: The Need for Molecular Diagnostics.

4. Annual Symposium on Molecular Pathology: DNA Technology in the Clinical Laboratory: Beaumont Hospital, Troy Michigan. September 2008. "The Problem with Hidden β-lactamases: The Role of Molecular Diagnostics"

5. American Society of Microbiology 45th Interscience Conference on Antimicrobial Agents and Chemotherapy: Washington DC, USA: December 2005. "Detection of Extended Spectrum β-lactamases and Plasmid-mediated AmpC β-lactamases Using Phenotypic and Molecular Tests.

6. American Society of Microbiology Symposium Speaker: Salt Lake City, Utah, USA: May 2002. "AmpC β-Lactamases: A Conundrum."

Regional

1. Northeastern State University, Tahlequah, OK, **Departmental Seminar Speaker**. October 9, 2009. Title: "The role of gene expression in Gram-negative Resistance: The AmpC Story"
2. Washburn University, Wichita, KS. **Departmental Seminar Speaker**. March 6, 2009. Title: "The role of gene expression in Gram-negative Resistance: The AmpC Story"
3. Washburn University. **Guest Speaker for Tri Beta Induction Ceremony**. March 5, 2009. Title: "Journey of a Scientist: From Slime Mold to Antibiotic Resistance".
4. **American Society for Microbiology Missouri Valley Branch Annual Meeting.** William Jewell College in Liberty, Missouri. March 14, 2008. Symposium Speaker: Title: Emergence of Resistance in the absence of Direct Selective Pressure: A Story from a Cystic Fibrosis Patient.
5. **Great Plains Infectious Disease Meeting,** Lawrence Kansas, November 4, 2006. Symposium Speaker: Title: "Molecular Mechanisms of AmpC-mediated Resistance in Gram-negative Pathogens".
6. **American Society for Microbiology Missouri Valley Branch Annual Meeting**, Kansas City, Missouri. April 2006. Part of a four speaker symposium entitled: "Mobil Genetic Elements" My talk was entitled: "Mobile Genetic Elements Associated with β-lactam Resistance."
7. **Oklahoma State University**: Stillwater Oklahoma. October 28, 2002.
8. **University of Kansas, St. Lukes Hospital.** October 15, 2002.
9. **Great Plains State Society for Molecular Biology and Genetics:** Omaha, Nebraska, USA: June 2002. "AmpC-mediated resistance in Gram-negative bacteria: Questions but not many answers."
10. **American Society for Microbiology Missouri Valley Branch Annual Meeting**, Kansas City, Missouri. March 2000. Part of a four speaker symposium entitled: "Antibacterial Resistance: Are we approaching the post-antibiotic era? My talk was entitled: "AmpC-mediated resistance."
11. **Regional American Association for the Advancement of Science Meeting**. Creighton University. **Keynote address**. AmpC β-lactamases: A Conundrum. 2001.

Local

1. Creighton University Biology Department: Guest Speaker: Phi Sigma Induction Ceremony. April 16, 2009. "Journey of a Scientist: From Slime Mold to Antibiotic Resistance".
2. Creighton University School of Medicine. Graduate Seminar Speaker. December 2007. The Role of Gene Expression in Gram-negative Resistance: The AmpC Story
3. University of Nebraska Lincoln. Graduate Seminar Speaker. March 2007. AmpC β-lactamase gene expression: The Role in the Resistance Phenotype.
4. Children's Hospital, Grand Rounds. January 2004. Evolution of Antibiotic Resistance and the Concomitant Decrease in Therapeutic Options for Lung Infections in the Cystic Fibrosis Patient.
5. University of Nebraska at Omaha. Graduate Seminar Speaker, November 2000. Title: "The regulation of AmpC β-lactamase expression in Enterobacteriaceae and its relationship to resistance."
6. University of Nebraska Lincoln. Graduate Seminar Speaker, February 2001. Title: "The regulation of AmpC β-lactamase expression in Enterobacteriaceae and its relationship to resistance.
7. V.A. Medical Center, Omaha NE. Seminar Speaker, February 2001. Title: "The regulation of AmpC β-lactamase expression in Enterobacteriaceae and its relationship to resistance."

SELECTED PUBLISHED ABSTRACTS

1. Unusual Phenotype of Metallo-β-lactamase (MBL) Producing USA Isolate of *Proteus mirabilis* (PM). 2010. E. S. Moland, K. I. Rogers, C. N. Geyer, N. D. Hanson, J. M. Reuter, K. S. Thomson. *In* Abstracts of the 110th American Society of Microbiology. San Diego, CA . Poster Presentation.
2. Metallo-β-lactamase Producing Isolate of *Pseudomonas putida* in Kentucky. 2010Ellen S. Moland, **Nancy D. Hanson**, Chelsie N. Geyer, Susan B Overman, Susan G. Shepherd, Julie Ribes, and Kenneth S. Thomson. *In* Abstracts of the 110th American Society of Microbiology. San Diego, CA . Poster Presentation.
3. Impact of KPC-β-Lactamase on Ceftazidime and Imipenem MICs for *Escherichia coli, Klebsiella pneumoniae*, and *Enterobacter cloacae*. 2009. Roth, ARL, PD Lister and **ND Hanson**. *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA . Poster Presentation.
4. Characterization of *oprD* promoter elements in *Pseudomonas aeruginosa* by deletion clone analysis. 2009. PD Lister, **ND Hanson**, AJ Schmidtke and DJ Wolter. *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA . Poster Presentation.
5. IS5 Insertion Sequence Associated with Divergently Tandem bla_{CMY-2} Genes in Clinical Isolates of *Escherichia coli*. 2009. P. Kurpiel and **ND Hanson**. *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA . Poster Presentation.
6. Impact of KPC-2 in Addition to Chromosomal Mechanisms of β-lactam Resistance on Susceptibility of *Pseudomonas aeruginosa*. 2009. D.J. Wolter, A.J. Schmidtke, P.D. Lister, and **N.D. Hanson.** *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA. **Oral presentation which I presented.**
7. Genetic and Biochemical Characterization of IMP-18, a MBL Determinant Identified in a *Pseudomonas aeruginosa* Isolate from the U.S.A.2009. Borgianni L., Prandi S., Salden L., Santella G., **Hanson N.D.**, Rossolini G.M., Docquier J.D. *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA. Poster presentation
8. Concerns about ESBL Testing in 2010. 2009. ES Moland, JA Black, **ND Hanson**, and KS Thomson. *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA. Poster presentation
9. Concerns about KPC Screening and Confirmatory Tests. 2009 ES Moland, **ND Hanson**, SB Overman, SG Sheperd, J Ribes, and KS Thomson. *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA. Poster presentation
10. CTX-M-14-producing *Salmonella* in Egypt. 2009. SMM Abdel-Ghani, ES Moland, JA Black, **ND Hanson**, RV Goering, MA Amine, AE Saafan, S Helal, M Gaafar, M Adel and KS Thomson. . *In* Abstracts of the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, CA. Poster presentation
11. Correlation Between Piperacillin-Tazobactam (P/T) and Increased Expression of the Plasmid Encoded (PE) AmpC β-Lactamase (βL) bla_{CMY-2}. 2008 Kurpiel, P. and **N.D. Hanson***. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC. Poster Presentation.

12. Identification of CTX-M and OXA-30 β-lactamases (βLs) in *Escherichia coli* (Ec) and *Klebsiella pneumoniae* (Kp) strains from a Hospital in Nigeria. 2008. Fashae, K., Adebiyi O.E, Ogunsola F.T' Cavalieri S.J, and **N.D. Hanson***. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC. **Oral Presentation.**
13. MexT-Associated Downregulation of oprD in *Pseudomonas aeruginosa* (PA) Involves Inhibition of Transcription Initiation. 2008. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC.
14. Novel Mechanisms of *mexEF-oprN* Efflux Pump Overexpression in *Pseudomonas aeruginosa* Without Co-Regulation of *opr*D Expression. 2008. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC.
15. Discordance Between Imipenem (IMP) Resistance and *opr*D Expression in a *Pseudomonas aeruginosa* (PA) Overexpressing *mexEF-oprN* (EFN). D.J. Wolter, N.D. Hanson, P.D. Lister. 2008. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC.
16. Dissemination and molecular epidemiology of KPC producing *K. pneumoniae* (*Kp*) collected in the Puerto Rico Medical Center Hospitals (PRMCH) during 2003-04. 2008. Robledo, I. G.J. Vazquez, E. A. Aquino, R. V. Goering, E. S. Moland, M.I. Sante, and **N.D. Hanson**. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC. **Oral Presentation.**
17. A novel KPC variant, KPC-6, in a *Klebsiella pneumoniae* (*Kp*) isolated in Puerto Rico (PR). 2008. Robledo, I. G.J. Vazquez, E. A. Aquino, R. V. Goering, E. S. Moland, M.I. Sante, and **N.D. Hanson**. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC. **Oral Presentation.**
18. Occurrence of plasmid-mediated AmpC β-lactamases (pAmpCs) In Isolates from Ten Sites within the U.S. 2008. Moland, E.S., N.D. Hanson, K.S. Thomson, C. Ginocchio, S. Condon, G. Denys, K. Koch, J. Snyder, G. Munier, D. Halstead, J. Abid, D. Welch, R. Lerma, L. Buck, G. Brooks, B. Haller, M. Wong, M. Vietty, K. Sandhu, and P. Bourbeau. *In* Abstracts of the 48th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC.
19. Emergence of meropenem (MEM) resistance in Pseudomonas aeruginosa (PA) from a cystic fibrosis (CF) patient in the absence of carbapenem therapy. 2007. D.J. Wolter, D. Acquazzino, R. V. Goering, P. Sammut, and **N.D. Hanson**. *In* Abstracts of the 47th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago.
20. Complexity of ampD expression in Pseudomonas aeruginosa (PA). 2007. A.J. Schmidtke and **N. D. Hanson**. *In* Abstracts of the 47th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago.
21. Detection of KPC carbapenem hydrolyzing β-lactamase in Pseudomonas aeruginosa (PA) from the Puerto Rico Medical Center Hospitals (PRMCHs). 2007. D. J. Wolter, G.J. Vazquez, I.E. Robledo, M. I. Sante, R.V. Goering, **N.D. Hanson**. *In* Abstracts of the 47th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago.
22. First Report of a KPC-4 and CTX-M producing K. pneumoniae (Kp) isolated from Puerto Rico (PR). I.E. Robledo, E. S. Moland, E.A. Aquino, G. J. Vazquez, M.I. Sante, J. Bertran, and **N. D. Hanson**. *In* Abstracts of the 47th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago.
23. Cautions about AmpC detection tests. 2007. E. Smith Moland, P. Bourpeau, **N.D. Hanson**, K.S. Thomson. *In* Abstracts of the 47th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago.

24. Positive ESBL screens in E. coli (Eco), Klebsiella pneumoniae (KP), Klebsiella oxytoca (KO), and Proteus mirabilis (PM) due to AmpC production. E. Smith Moland, C. L. Johnson, G. K. Munier, J.W. Snyder, **N.D. Hanson**, K.S. Thomson. *In* Abstracts of the 47th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago.
25. Comparative analysis of blaCMY-7 expression in mutlidrug-resistant canine and human Escherichia coli isolates from Australia. 2007. H.E.Sidjabat, **N.D.Hanson**, and D.J. Trott. *In* Abstracts of the 107th American Society for Microbiology, General Meeting. Toronto Canada.
26. Co-production of the novel extended-spectrum β-lactamase, VEB-5 and an OXA-30 enzyme in an E. coli isolate from the United States. 2007. N. Khalaf, E.S. MOland, K.S. Thomson, B. Hanna, and **N.D Hanson**. *In* Abstracts of the 107th American Society for Microbiology, General Meeting. Toronto Canada.
27. Surveillance of community-based reservoirs real the co-production of a CMY-2 AmpC β-lactamase and a CTX-M-14 extended spectrum β-lactamase in isolates of *Klebsiella pneumoniae* and *Escherichia coli*. E. S. Moland, S G. Hong, K. Propst, S. J. Cavalieri, and **N. D. Hanson**. 2006. *In* Abstracts of the 46th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Fransisco.
28. Imported AmpC β-lactmases can cause false positive ESBL confirmatory disk tests. E. S. Moland, S G. Hong, K. Propst, S. J. Cavalieri, and **N. D. Hanson**. 2006. *In* Abstracts of the 46th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Fransisco.
29. U.S. isolate of *Klebsiella pneumoniae* producing VIM metallo-β-lactamase and SHV-5-like ESBL. E. S. Moland, S G. Hong, T. Cleary, M.I. Morris, **N. D. Hanson** and K.S. Thomson. 2006. *In* Abstracts of the 46th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Fransisco.
30. Correlation of *amp*C Induction with PBP Binding in *Enterobacter cloacae*. B. Abdalhamid, P. A. Wickman, and **N. D. Hanson**. 2005 *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
31. A Novel Mechanism of AmpD-Mediated Derepression in an Isolate of *Citrobacter freundii*. A. J. Schmidtke and **N.D. Hanson**. 2005 *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
32. Efflux Pump and Porin Alterations in a Supersuceptible (SS) Strain of P. aeruginosa (PA). D. J. Wolter, J. A. Black, P. D. Lister, **N. D. Hanson**. 2005. *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
33. Phenotypic Reversion of Imipenem Hypersusceptibility among mexCD-oprJ-Oeverexpressing *P. aeruginosa*: a complex system becomes more complex. 2005. D. J. Wolter, **N. D. Hanson**, P.D. Lister. *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
34. OXA-30-Like β-lactamases in E. coli Hydrolyze Cefepime. E. S. Moland, **N. D. Hanson**, C. Shubert, K. S. Thomson. 2005. *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
35. In Vitro Development of Resistance to DX-619 (DX) and Other Quinolones (Qs) in Enterococcus faecium. P. Wickman, J. A. Black, E. Smith Moland, K. S. Thomson, and **N. D. Hanson**. 2005. *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
36. Apparent Acquistion of ESBL Leading to Treatment Failure during Cefepime (FEP) Therapy of Klebsiella pneumoniae (KP) Bacteremia. W. Song, E. Smith Moland, **N. D. Hanson**, J. S. Lewis, J. H. Jorgensen, and K. S. Thomson. 2005. *In* Abstracts of the 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C

37. Development of a Model System to Determine the Effect of ampD mutations on β-lactam Resistance. 2004. A. J. Schmidtke and **N.D. Hanson**. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
38. Increased Expression of *amp*C in *Pseudomonas aeruginosa* mutants following exposure to ciprofloxacin (CIP). D. J. Wolter, **N.D. Hanson**, and P.D.Lister. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
39. The First Occurrence of a Pseudomonas aeruginosa in the United States (US) Producing and IMP Metallo-β-lactamase (MBL). **N.D.Hanson**, A. Hossain, L. Buck, E.S. Moland, and K.S. Thomson. 2004 *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
40. β-lactam MICs and differential expression of blaCMY-2 reflect dual promoter activity. M.D. Reisbig and **N.D. Hanson**. 2004. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
41. Comparison of *amp*C transcript half-life among three genera of Enterobacteriaceae. B. Abdalhalmid and **N. D. Hanson**. 2004. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
42. A community-wide outbreak of clonally related Escherichia coli producing CTX-M-type β-lactamases in the Calgary Health Region (CHR).2004. J. D. D. Pitout, D. B. Gregson, D. L. Church, K. B. Laupland, S. Elsayed, and N. D. Hanson. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
43. *Klebsiella* isolates that Co-produce ESBL and inducible DHA-like plasmid-mediated AmpC beta-lactamases from Baltimore, MD and Tampa, FL. Black, J.A., E.S. Moland, A. Hossain, J.A. Johnson, M. Campbell, T.J. Lockhart, L.B. Olson, K. S. Thomson, and **N. D. Hanson**. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
44. Occurrence of *Proteus mirabilis* producing FOX-5 plasmid-mediated AmpC beta-lactamase in USA. Black, J.A., E.S. Moland, A. Hossain, G.A. Denys, , T.J. Lockhart, L.B. Olson, K. S. Thomson, and **N. D. Hanson**. *In* Abstracts of the 44th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, D.C.
45. Deletional Analysis of the $bla_{\text{Mir-1}}$ Upstream Region Reveals a Novel Promoter Necessary for High-Level Expression and β-Lactam Resistance. 2003. M. D. Reisbig and **N. D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
46. *Citrobacter freundii* from Canada Producing A Novel CTX-M Gene, $bla_{\text{CTX-M-30}}$. 2003. A. Abdalhamid, J.D.D. Pitout, **N.D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
47. Emergence of Fluoroquinolone (FQ) Resistant *Pseudomonas aeruginosa* (PA) in a Cystic Fibrosis (CF) Patient: Discordance between MexEF-OprN and Carbapenem Susceptibility. 2003. D.J. Wolters, J. Black, D. Acquazzino, R. Goering, P.Sammut, **N. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois. **Oral Presentation**
48. A Novel Mechanism of Resistance to Ciprofloxacin (CIP) and Ethidium Bromide (EB) in *Streptococcus pneumoniae* (SP): Downregulation of a Putative Permease. 2003. P.A. Wichman, G. A. Perry, K.S. Thomson, **N. D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois. **Oral Presentation**
49. Molecular Analysis of 10 Putative Efflux Genes in *Streptococcus pneumoniae* (SP) Reveals Widespread Differences Between Wildtype (WT) Strains and Multi-Drug Resistant (MDR)

Clinical Isolates. 2003. P.A. Wichman, K.S. Thomson, **N.D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois. **Oral Presentation**

50. Insertional Inactivation of *opr*D in Clinical Isolates of *Pseudomonas aeruginosa* Leading to Carbapenem Resistance. 2003. D.J. Wolter, **N. Hanson**, P. Lister. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois. **Oral Presentation**
51. Surveillance for *Escherichia coli* Producing CTX-M-Type β-Lactamases in the Calgary Health Region (CHR). 2003. J.D.D. Pitout, K.B. Laupland, D.L. Church, S. Elsayed, D. Gregson, **N.D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
52. Detection of CTX-M-Like ESBLs in Thirteen States within the USA. 2003. E.S. Moland, J.A. Black, K.S. Thomson, **N.D. Hanson**, T. J. Lockhart, L.B. Olson, A. Hossain.
53. Characterisation of β-lactamases Responsible for Resistance to Extended-Spectrum Cephalosporins in *E. coli* and *S. enterica* from U.K. Food Animals. 2003. E. Liebana, M. Gibbs, C. Clouting, L. Barker, F. Clifton-Hadley, E. Pleydell, B. Abdalhamid, **N. Hanson**, L. Martin, C. Poppe, R. Davies. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
54. *E. coli* producing KPC-3 carbapenem hydrolyzing enzyme (CHE). 2003. T. Hong, E.S. Moland, B. Abdalhamid, **N.D. Hanson**, J. Wang, C. Sloan, D. Fabian, A. Farajallah, J. Levine, K.S. Thomson. 2003. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
55. A New Quality Control Strain for Routine Testing for Production of Extended Spectrum Beta-Lactamases (ESBL). 2003. J.E. Mortensen, M. Bernier, L. Gray, S. Doland, E.S. Moland, B. Abdalhamid, **N.D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
56. Prevalence of ESBLs in the United States. 2003. E. Smith Moland, J.A. Black, **N.D. Hanson**, A. Hossain, B. Abdalhamid, W. Song, T.J. Lockhart, L.B. Olson, K.S. Thomson. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
57. First Report of Plasmid-encoded (PE) Carbapenem Hydrolyzing Enzyme (CHE) KPC-2 in *Enterobacter cloacae* (EC). 2003 A. Hossain, M.J. Ferraro, R.M. Pino, R.B. Dew III, E.S. Moland, T.J. Lochart, K.S. Thomson, R.V. Goering, and **N.D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
58. Prevalence of Plasmid-mediated AmpC β-lactamases in *Klebsiella pneumoniae* (KP), *Klebsiella oxytoca* (KO), *Proteus mirabilis* (PM), and *Salmonella* (S) Isolates from 42 ICU and 21 non-ICU Sites in the United States. 2003 J.A. Black, E.Smith Moland, A. Hossain, T.J. Lockhard, L.B. Olson, K.S. Thomson, **N.D. Hanson**. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
59. Occurrence of a CTX-M-1-like ESBL in a U.S. Isolate of *Citrobacter freundii* (CF). 2003. S.E. Sharp, C. Suarez, E. Smith Moland, A. Hossain, **N.D. Hanson**, and K.S. Thomson. *In* Abstracts of the 43rd Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
60. Evaluation of cefepime (FEP) with and without clavulanic acid (CA) for the detection of ESBLs (Extended Spectrum Beta-Lactamases) in Enterobacteriaceae species. 2004. E. Smith Moland, T.J. Lockkhart, J.A. Black, L.B. Olson, A. HOssain, N.D. Hanson, and K.S. Thomson. *In* Clinical Microbiology and Infection. 14th European Congress of Clinical Microbiology and Infectious Diseases.

61. Survey of cefoxitin (FOX) non-wusceptible (NS) E. coli urine isolates (UIs) reveals a high incidence of plasmid-encoded AmpC (pAmpC) β-Lactamase (βL) Producers. 2004. M.D. Reisbig, S.J. Cavalieri, H.A. Hashish, R.V. Goering, and N.D. Hanson. *In* Abstracts of the 104th General Meeting of the American Society for Microbiology. New Orleans, LA.
62. Laboratory Diagnosis of *Escherichia coli* and *Klebsiella* spp. producing CTX-M-ß-lactamases. 2004. J. D. D. Pitout, A. Hossain, D. L. Church, N. D. Hanson. *In* Abstracts of the 104th General Meeting of the American Society for Microbiology. New Orleans, LA.
63. Paediatric infection due to multi-resistant *Salmonella* Infantis carrying bla_{CMY-2}, bla_{TEM-1}, $bla_{CTX-M-15}$ and bla_{SHV-5} β-lactamases. 2004. E. Liebana, J. Martinez-Urtaza, M. Batchelor, C. Torres, L. Brinas, L.A. Lagos, B. Abdalhamid, N.D. Nanson, F.A. Clifton-Hadley, R.H. Davies. *In* Abstracts of the 104th General Meeting of the American Society for Microbiology. New Orleans, LA.
64. Variations in β-lactam susceptibilities between organisms expressing the plasmid-encoded AmpC β-lactamase CMY-2 is attributed to variable gene expression. 2003. M.D. Reisbig and **N.D. Hanson**. *In* Clinical Microbiology and Infection 9:(S)1:118. 13th European Congress of Clinical Microbiology and Infectious Diseases.
65. Molecular analysis of *Streptococcus pneumoniae* mutants selected by DK-507k, an investigational fluoroquinolone. 2003. A. Hossain, P. Wickman, K.S. Thomson, and **N.D. Hanson**. *In* Clinical Microbiology and Infection 9:(S)1:180. 13th European Congress of Clinical Microbiology and Infectious Diseases.
66. High-level expression of the plasmid-encoded AmpC gene, bla_{CMY-7} does not compromise the virulent phenotype of a strain of *Salmonella typhimurium*. 2003. A. Hossain, M.D. Reisbig, and **N.D. Hanson**. *In* Clinical Microbiology and Infection 9:(S)1:129. 13th European Congress of Clinical Microbiology and Infectious Diseases.
67. Pharmacodynamics of cefepime-aztreonam combination against *Pseudomonas aeruginosa* isolated from cystic fibrosis patients. 2003. D. Wolter, M. Reisbig, **N. Hanson**, and P. Lister. *In* Clinical Microbiology and Infection 9:(S)1:70. 13th European Congress of Clinical Microbiology and Infectious Diseases.
68. Multi-drug resistance associated with MexXY expression in clinical isolates of Pseudomonas aeruginosa from a Texas hospital. 2003. D.J. Wolter, **N.D. Hanson**, P.D. Lister. *In* Clinical Microbiology and Infection 9:(S)1:56. 13th European Congress of Clinical Microbiology and Infectious Diseases.
69. Differences in selection of efflux-mediated fluoroquinolone resistance in penicillin-susceptible and –resistant *Streptococcus pneumoniae* after repeated exposure to ciprofloxacin and moxifloxacin. 2003. P.A. Wickman, A. Hossain, K.S. Thomson, and **N.D. Hanson**. *In* Clinical Microbiology and Infection 9: (S)1:377. 13th European Congress of Clinical Microbiology and Infectious Diseases.
70. Reisbig, M.D. and **N.D. Hanson**. 2002. The Role of Gene Copy Number in Overall Expression of *amp*C Genes of *Enterobacter cloacae* Origin. *In* Abstracts of the 102nd General Meeting of the American Society for Microbiology. Salt Lake City, Utah.
71. Morrow, S.S. and **N.D. Hanson**. 2002. Differentiation of Multiple SHV or FOX Genes Using Denaturing High Performance Liquid Chromatography. 2002. *In* Abstracts of the 102nd General Meeting of the American Society for Microbiology. Salt Lake City, Utah.
72. Wolter, D.J., **N.D. Hanson**, G. Haynatzki, and P.D. Lister. 2002. Efflux-Mediated Resistance Among *Pseudomonas aeruginosa*: Complex Regulation of a Complex Resistance Mechanism. *In* Abstracts of the 102nd General Meeting of the American Society for Microbiology. Salt Lake City, Utah.

73. Wickman, P.A., A. Hossain, K.S. Thomson, and **N.D. Hanson.** 2002. Moxifloxacin has Reduced Potential to Select Mutational Fluoroquinolone Resistance in *Streptococcus pneumoniae*. *In* Abstracts of the 102nd General Meeting of the American Society for Microbiology. Salt Lake City, Utah.
74. Moland, E.S., K.K. Sandu, M.R. Pincus, J.A. Black, M.D. Reisbig, N.D. Hanson, K.S. Thomson. 2002. A Simple Phenotypic Approach to the Detection of Inducible Plasmid-mediated AmpC β-lactamse (pAmpC) Production in Two New York Isolated of *Klebsiella pneumoniae* (KP). *In* Abstracts of the 102nd General Meeting of the American Society for Microbiology. Salt Lake City, Utah.
75. **Hanson, N.D.**, S.A. Neville, I.B. Gosbell, A. Hossain, E.S. Moland, and K.S. Thomson. 2001. *Salmonella enterica* serotype Typhimurium producing CMY-7, SHV-9 and OXA-30 β-Lactamases. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
76. Mahlen, S.D. and **N.D. Hanson**. 2001. The Stem-Loop Structure in the 5'Untranslated Region (5'UTR) of the ampC Transcript of Serratia marcescens is Involved in Transcript Stability. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois. Oral Presentation given by N.D. Hanson.
77. Reisbig, M.D. and **N.D. Hanson.** 2001. The Plasmid-mediated AmpC β-Lactamase, ACT-1, is Inducible in a Multiply Resistant *Klebsiella pneumoniae* Isolate. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
78. Herrera, V.L. and **N.D. Hanson**. 2001. Complex Expression of Novel Plasmid-mediated AmpC β-Lactamase Gene. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
79. Jiang, Y., E.S. Moland, Y.Ni, **N.D. Hanson**. 2001. Novel Mutations in the Promoter and Attenuator Regions of Hyperproducing AmpC *E. coli* strains from China. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
80. Hossain, A., E.S. Moland, J.A. Black, S.A. Chartrand, **N.D. Hanson**, K.S. Thomson. 2001. A New Fluoroquinolone (FQ) With a Low Frequency of Mutational Resistance in MRSA. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
81. Moland, E.S., J. Johnson, J.A. Black, T.J. Lockhart, A. Hossain, V.L. Herrera, R.V. Goering, **N.D. Hanson**, and K.S. Thomson. 2001. *Klebsiella pneumoniae* (KP) Isolates Producing a Carbapenem Hydrolyzing Enzyme (CHE). *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
82. Moland, E.S., T.J. Cleary, M.D. Reisbig, Y. Jiang, P.E. Coudron, T.J. Lockhart, **N.D. Hanson**, K.S. Thomson. 2001. Occurrence of Inducible Plasmid-mediated AmpC β-lactamase (ipAmpC), DHA-1, in a Miami Isolate of *Klebsiella pneumoniae*: New Implications for Susceptibility Testing? *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
83. Coudron, P.E., S.M. Tallent, E.S. Moland, **N.D. Hanson**, M.B. Edmond, R.P. Wenzel. 2001. Occurrence of Extended-Spectrum (ESBL) and AmpC Beta-Lactamases (BLs) in U.S. Bacteremic Isolates of *Klebsiella pneumoniae* (Kp): Two Isolates Harbor Inducible Plasmid-Mediated ACT-1-Like BLs. *In* Abstracts of the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois.
84. Mahlen, S.D. and **N.D. Hanson**. 2000. A Novel Growth-Phase Dependent Factor that Binds to the *Serratia marcescens ampC* gene and correlates with a Decrease in *ampC* Transcription.*In* Abstracts of the 40th Interscience Conference on Antimicrobial Agents and Chemotherapy. Toronto, Ontario, Canada. **Oral Presentation**.

85. **Hanson, N. D.**, P. Coudron, E. S. Moland, and C. C. Sanders. 1999. The Identification, Cloning and Sequencing of a New FOX-like Plasmid-mediated AmpC, *In* Abstracts of the 39th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, California. American Society for Microbiology, Washington, DC. Poster Presentation.
86. Morrow, S. S., C. C. Sanders, and **N. D. Hanson**. 1999. Cloning and Sequencing of the Chromosomally Encoded *amp*C and *amp*R genes of *Serratia marcescens*, *In* Abstracts of the 39th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, California. American Society for Microbiology, Washington, DC. Poster Presentation.
87. **Hanson, N.D.**, Pitout, J.D.D., Sanders, C.C., Moland, E.S. 1998. A Novel TEM-type Extended Spectrum Beta-Lactamase Expressed in Three Different Genera of Enterobacteriaceae from South Africa. *In* Abstracts of the 38th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Diego, CA. Poster Presentation.
88. **Hanson, N.D.**, Thomson, K.S., Moland, E.S., Sanders, C.C., Berthold, G. and Penn, R. 1997. Molecular Characterization of a Multiply Resistant *Klebsiella Pneumoniae*. *In* Abstracts of the 37th Interscience Conference on Antimicrobial Agents and Chemotherapy. Toronto, Ontario, Canada. **Oral Presentation.**
89. Pitout, J.D.D., **Hanson, N.D.**, Ehrhardt, A.F., Klugman, K.P., Saunders, L., Brink, A. 1996. ß-lactamases Responsible for Resistance to Expanded-spectrum Cephalosporins among *Klebsiella pneumoniae* , *Escherichia coli* and *Proteus mirabilis* Isolates Recovered in South Africa. *In* Abstracts of the 96th ASM General Meeting. New Orleans, Louisiana. Poster Presentation.

TEACHING

School of Medicine

Principals of Microbiology (IDC 107): Six lectures on the basic science of viruses including structure/function, genome replication, and viral genetics.
Every year from1996-present.

Infectious Disease Course (MIC 223): Six and one-half lectures including a review from year one on the basic science of viruses in addition to 3.5 lectures on the basic science of DNA viruses, paramyxoviruses, and gastorintestinal viruses as they relate to clinical relevance.
Every year from 1996-present.

Small Group effort for Infectious Disease Course: 4 hours. Fall 97

Small Group effort for Molecular and Cell Biology Course: 2 hrs. 1999.

Medical Student Research Advisor

I have had the pleasure of three medical students in my laboratory for summer research projects. Each student excelled in his or her projects as described below.

John Schrader, Creighton Medical Student, Presented data obtained in summer of 1998 at the 1999 Midwest Student Research Forum, 1st place media services oral presentation competition.

Tina Svatos, Creighton Medical Student, Presented data obtained in summer of 2000 at the 2001 Midwest Student Research Forum, **1st place medical student oral presentation competition.** Seminar Title: Evaluation of Nucleotide Diversity within *Pseudomonas aeruginosa ampC* β-lactamase genes.

Jason Ourada, Creighton Medical Student, summer of 2001. Project Title: Genetic analysis of plasmid-mediated AmpC β-lactamases of clinical isolates from U.S. hospitals. **4th place medical student oral presentation competition.** Seminar Title: Identification of Plasmid-mediated AmpC β-lactamases in Clinical Isolates from U.S. Hospitals. Part of Jason's work is submitted for publication (See list of manuscripts submitted)

School of Pharmacy

Medical Microbiology and Immunology (MIC 541): Pharmacy Course, 6 lectures on basic virology and how antivirals interfere with viral replication. 2001-2008.

Also involved in preparing these lectures for the WEB-based pharmacy course.

School of Denistry

ORAL MICROBIOLOGY & IMMUNOLOGY (ORB 211): 6 lectures on basic virology and symptoms associated with respiratory and blood borne viruses.

Graduate School

Bacterial Physiology (MIC 739): Course Director as of Spring 2007. Re-organized the course with emphasis on lectures and discussion of journal articles related to bacterial physiology.

Essentials in Microbiology (MIC614) 6 Lectures; Topics included viral structure, viral classification, viral replication, detection and laboratory diagnosis of viral infections, and molecular gene transfer. 1996-1997.

Antimicrobial Agents and Chemotherapy (MIC 753): AmpC Cephalosporinases (3 lectures), Susceptibility Testing Laboratory (1 hour), Antivirals (2 lectures), Novel Targets for Antibacterial Agents (1 lecture), Student presentations (3 hrs).
Years 1997, 1999, 2001

Diagnostic Microbiology (MIC735): One lecture on the Uses of PCR in Virology.
Years 1996, 1998, and 2000, 2002, 2004, 2006.

Advanced Molecular (BMS 704) Viral and host cell interactions (4 lectures). (2000, 2002, 2004, 2006)

Graduate Student Major Advisor

1. Stacey Morrow, **M.S. 1999**, Department of Medical Microbiology and Immunology. **Thesis Title: "Sequence Analysis of the *ampC* and *ampR* Regions of *Serratia marcescens* Reveals Unusual Sequence and Structural Properties."**

2. Steven Mahlen, **Ph.D. 2001**, Department of Medical Microbiology and Immunology **Dissertation Title: "The Expression of the AmpC β-Lactamase of *Serratia marcescens* is Regulated at Multiple Levels."**

3. Mark Reisbig, **Ph.D.** Department of Medical Microbiology and Immunology **Dissertation Title: Mechanisms of Regulation and Resistance for Plasmid-encoded *amp*C β-Lactamase Genes**. 1999-2003.

4. Vicki Herrera, (M.S. student): Department of Medical Microbiology and Immunology. **Regulation of Expression of the plasmid-mediated *amp*C gene, FOX-5b.** 2000-2004.

5. Baha Abdalhamid, **PhD**: Department of Medical Microbiology and Immunology. **Dissertation Title: The Influence of *amp*C Expression and Penicillin Binding Protein Binding on the Variation of β-lactam Induction Potential in Three Genera of Enterobacteriaceae.** 2001-2005.

6. Amber Schimtke, **PhD**: Department of Medical Microbiology and Immunology. **Dissertation Title: The effect of *amp*D on *amp*C expression in *Pseudomonas aeruginosa* and *Citrobacter freundii*.** 2003-2008.

7. Philip Kurpiel, PhD Student: Department of Medical Microbiology and Immunology. (Start date in my laboratory, February 2007)

8. Amanda Roth, PhD student: Department of Medical Microbiology and Immunology. (Start date in my laboratory, May 2008).

9. Randy Fowler, PhD student: Department of Medical Microbiology and Immunology. (Start date in my laboratory, August 2008).

10. Chelsea Gyer, PhD student: Department of Medical Microbiology and Immunology. (Start date in my laboratory, August 2009).

11. Nyssa Moulds (M.S. student): Department of Medical Microbiology and Immunology. (Start date in my laboratory, August 2009).

The Center for Research and Biotechnology (CRAB) has supported several graduate students over the years. As Director of Molecular Biology for CRAB, I oversee all molecular work for the center. Therefore, I oversee and train the graduate students of other CRAB faculty members in the molecular techniques required for their Ph.D. projects. These students are listed below under graduate student committees. Those students in which the molecular portions of their dissertation were completed in my laboratory are designated by a *.

Graduate Student Committees

1. Victoria Gardner, **M.S.,** 1997, Department of Medical Microbiology and Immunology.
2. Sanju Balaram, **Ph.D**. 1998, Department of Medical Microbiology and

Immunology.

3. R. Todd Allen, **Ph.D**. Department of Medical Microbiology and Immunology Thesis Defense 7/2000.
4. Yuging Shen, **M.S**.. Department of Biomedical Sciences. Thesis Defense 4/28/00.
5. William Staplin, **Ph.D**. Department of Biomedical Sciences. Thesis Defense 6/14/02.
6. Anela Bonic, **Ph.D**. Department of Biomedical Sciences. Thesis Defense 7/18/02.
7. Ellyn Mulcahy, **Ph.D**. Department of Medical Microbiology and Immunology 1997-2003
8. Marianne Mannion, **Ph.D**. Department of Medical Microbiology and Immunology. 1997-2003
9. Kara Cooper, **Ph.D**., Department of Medical Microbiology and Immunology 1998-2004.
10. Kristopher Krueger, M.D./Ph.D. student, Department of Medical Microbiology and Immunology; 1998-present
11. Daniel Wolter*, **Ph.D**. 12/16/04, Department of Medical Microbiology and Immunology. **CRAB Student**. 1998-present
12. Paul Wickham*, Ph.D. student, Department of Medical Microbiology and Immunology. **CRAB Student**. 2000-2006
13. Barbara Kimbawa, Ph.D. **CRAB Student**, Department of Medical Microbiology and Immunology. 2001-present.
14. Ming Zhang, Ph.D student, Department of Medical Microbiology and Immunology. 2004-2009.
15. Meghan Donnellan Ph.D student, Department of Medical Microbiology and Immunology. (Fall 2007 to December 2009)
16. Cameron Schweitzer, Ph.D student, Department of Medical Microbiology and Immunology. (Fall 2007 to present)

Undergraduate Education Biology Department

Six undergraduates have worked on research projects in my laboratory. I was involved in mentoring the students with respect to experimental design of the project, general concepts involved in understanding the project, techniques learned during the project, and presentation of the project as either an oral slide presentation or a poster presentation during the undergraduate research colloquium held by the Biology Department at the end of each spring semester.

Biology (497): Directed undergraduate research for Lisa Bedel (Fall 96/ Spring 97). Cloning of SHV β-lactamase genes.

Biology (497): Directed undergraduate research for Alika Maunakea (1996-2000): Analysis of *Enterobacter cloacae ampC* Diversity. Alika worked in my laboratory all four years but could only take this class and participate in the colloquium a maximum of 2 years.

Biology (497): Directed undergraduate research for Kristin Colonna (Fall 2000): Identification of clones with *ampC* gene inserts. Kristin worked in the lab for one semester but did not present her work at the colloquium.

Biology (497): Directed undergraduate research for Nicholas Glass (Spring 2002): Identification of *amp*C β-lactamase genes in clinical isolates.

Biology (497): **Directed undergraduate research** for Chelsey Petz (Spring 2004): Identification of QRDR mutations within the subunit genes of topoisomerase IV and DNA gyrase in *Pseudomonas aeruginosa*.

Biology (497): **Directed undergraduate research** for Scott Andrews (Spring 2008): Cloning and Characterization of the IMP-18 Metallo-β-lactamase.

Fellowship Program

Cellular and Molecular Biology of Cardiovascular Diseases: Fellows of the Cardiology Division. 1 lecture, Molecular Tools in Diagnostic Cardiovascular Research. 1998.

Foreign Student Mentor

Eight international students have completed training in my laboratory. The training they received in my laboratory and the subject of their training is described below.

1. Celine Herra. Trinity College, Dublin, **Ireland**. Studied in my laboratory learning molecular techniques for use in the evaluation of *amp*C gene expression and resistance in clinical isolates of *Serratia marcescens*. She was in the laboratory for one month, **June 2000**. In addition to Celine's training in my laboratory I helped direct her Ph.D. project and was involved in the reading and corrections concerning her thesis.

2. Jiang Yanqun. Shanghai 6th People's Hospital, Shanghai, **China**. Yan came to my laboratory to learn how to detect plasmid-mediated AmpC resistance in Gram-negative organisms as part of her Masters Thesis. We actually redesigned her thesis project to determine promoter mutations responsible for hyperexpression of *E. coli amp*C and correlated those mutations with cefoxitin MICs. She was in the laboratory from November **2000 to February 2001**. These data were presented as a poster at the international meeting, the 41st Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois, 2001.

3. Javier Perez. Basque Country University, Vitoria **Spain**. Javier contacted me in December 2000. He asked permission to use acquired grant monies to come to my laboratory to work on molecular identification of extended-spectrum β-lactamases and AmpC-mediated resistance. He completed his work in my laboratory from **July 2001 to October 2001**. A manuscript of this work has been published in the J. Clinical Microbiology, 2002.

4. Dr. Vaidehi Tiru. **India**. Dr. Tiru is a M.D. who runs a clinical laboratory in India. She requested and received molecular training from **April 15-May 17 2002**. Dr. Tiru is interested in molecular detection of β-lactam resistance in clinical isolates. She was trained in the areas of standard and multiplex PCR, as well as the RNA-based technique of reverse-transcriptase PCR. Dr. Vaidehi is back in India using the techniques she learned in

my laboratory to detect plasmid-mediated AmpC β-lactamase genes. She will be a valuable contact for surveillance studies we have planned for the future.

Dr. Vaidehi returned to my laboratory in **May from the 6th to 20th, 2004** to sharpen her skills in the area of molecular identification of resistant mechanisms in Gram-negative organisms.

5. Dr. Iraida E. Robledo. **Puerto Rico**. Dr. Robledo recently received her PhD and has taken a position at the University of Puerto Rico medical school where she will be involved in a project dealing with the antimicrobial resistance problem in San Juan, Puerto Rico. She came to my laboratory during **April of 2004** to learn PCR methodology for the detection of beta-lactamase genes. Iraida came back in **January 2007** as part of a minority NIH grant which I helped her write and spent 7 months in the laboratory learning molecular techniques and how to analyze Gram-negative organisms for mechanisms resulting in β-lactam resistance.

6. Hanna Sidjabat. **Australia**. Hanna Sidjabat was a PhD in Brisbane Australia in the Department of Veterinary Science. I served as an advisor for her PhD committee. Hanna visited and worked in my laboratory for **1 month in July of 2005**. She learned techniques such as primer extension analysis, conjugation, and Real-Time PCR.

7. Noha Khalaf, PhD. **Egypt**. **Fulbright Scholar**. Noha came to the laboratory in October of 2005 as a recipient of a Fulbright Fellowship to study molecular mechanisms of β-lactam resistance. Once her fellowship was completed she stayed on with the Center for Research in Anti-Infectives and Biotechnology as a post-doctoral fellow until December of 2007.

8. Kayode Fashe, PhD student, **Fulbright Scholar**, **Nigeria**. Kayode came to my laboratory in October 2007 until June 30, 2008 to learn how to do surveillance studies and study molecular mechanisms of organisms resistant to β-lactams.

Other Students

Several non-Creighton, non-graduate students have come to my laboratory to learn either some molecular techniques or to experience different aspects of scientific research. The students who participated in these learning experiences are listed below. As you can see I believe strongly in high school students getting a "flavor" of what being a scientist is all about.

1. Dr. Sudha Pottumarthy. Visiting scientist from University of Washington, Seattle. Dr. Pottumarthy received molecular training from April 2-May 10 2002. Dr. Pottumarthy is interested in molecular detection of β-lactam resistance in clinical isolates. She trained in the areas of standard and multiplex PCR as well as sequencing techniques.

2. Mei Lin Luo. Visiting undergraduate student from Oberlin College. Winter break research project. One month duration.

3. Clarence Smith Jr., Senior from University of Miami, 6 week experience. Clarence came to my lab wanting some kind of research experience so he would increase his chances of

getting into graduate school. He has succeeded in getting excepted to Mt. Sinai in New York.

4. Charlie Beer. High school student. My laboratory in conjunction with Children's Hospital Clinical Laboratory (Nancy Cornish) helped Charlie with a project for the metropolitan science and engineering fair held in March of 2001. My laboratory was responsible for helping Charlie understand PCR and sequencing techniques and to gather that data for his project.

5. Michelle Wise, Mercy High School, 1 day experience

6. Molly McGath, Mercy High School, 1 day experience

7. Katie Hansen, Gretna High School, 1 day experience

UNIVERSITY SERVICE

1. Appointed by Dean Zetterman to the Ad Hoc Investigative Committee (2009)
2. Appointed by Dean Enarson to the Learning Environment Task Force for the School of Medicine (2008)
3. Appointed by Dean Enarson to the Ad Hoc Investigative Committee (2007)
4. Appointed (by Dr. Sonnino) to the Rank Subcommittee of the Executive Committee (2007-08)
5. Reviewer (appointed by Graduate Dean) for the Creighton University Summer Faculty Research Fellowship in Biology (2007)
6. School of Arts and Sciences; Biology Search Committee for Microbiologist (Fall 2005)
7. Department of Medical Microbiology and Immunology, Chair Curriculum Committee (2005-present)
8. School of Medicine Radiation Safety Committee (2003-present)
9. School of Medicine Proteomics Core Facility Committee (Fall 2004-2006)
10. School of Medicine Molecular Core Facility Committee (Fall 2004-present)
11. School of Medicine Basic Science Departments Organizational Task Force (Fall 2004)
12. School of Medicine Core Facility Oversight Committee (Fall 2004-present)
13. School of Medicine Research Task Force. (Spring 2004)
14. School of Medicine Research Task Force Infrastructure subcommittee Chair. (Spring 2004).
15. Library Committee (2003-2006).
16. Abstract and poster presentation judge for the Midwest Student Medical Research Forum(1997-present)
17. Elected to the Executive Committee for the School of Medicine (Terms 1997-1999; 1999-2001, 2007-2009).
18. Elected to Faculty Council/Academic council representing the School of Medicine. Term 2001-2003.
19. Academic Council Executive Committee. Term 2002-2003.
20. Research Design Team for Mission Based Management (1999-2002).
21. Virology Search Committee for the Department of Medical Microbiology and Immunology (1998-present)
22. Molecular Genetics Search Committee for the School of Medicine. (1998-2002)

23. Graduate Curriculum Committee for the Department of Medical Microbiology and Immunology (1998-present).
24. Panelist for the Clare Boothe Luce Women in Science Discussion for Undergraduate Women (1997-present)
9. Pediatrics Chair Search Committee (2001-2002)
10. Internal Reviewer for Cancer and Smoking Disease Research Pilot Study Grant; 1996.
11. Selected by CME to sponsor of distinguished lecturer Dr. Sebastian G.B. Amyes, Ph.D. 2001
12. Sponsor of Visiting Scientist Seminar; Dr. Kimberly Lamb, 1999.
13. Participation in St. Albert's Day Science Program. 1998-2002.
14. Reviewer for Graduate School Summer Fellowships (2002)
15. Creighton HCOP Summer students (2001-2002)
16. Reviewer for Health Future Foundation Grants. 2002.

COMMUNITY SERVICE

1. Counselor Missouri Valley Branch, ASM, 2003-2005.
2. President Missouri Valley Branch, ASM, 2001-2003.
3. President-elect Missouri Valley Branch, ASM, 1999-2001
4. Metropolitan Science and Engineering Fair Judge. 1998 to present.
5. Panelist for "Expanding Your Horizons" conference at College of Saint Mary for young women (grades 7-9) interested in careers in math and science.
6. Panelist for "Expanding Your Horizons" A Career Conference for Middle School Girls Nebraska Math/Science Network Conference Committee.
7. Career Talk at Mercy High School. (1998)
8. Career Day/Science talks at local elementary schools.(1996-present)
9. Ralston High School Student Shadow Program, Alana Diltmyer. (1998)
10. Commencement Address: Gretna High School. 1999
11. Speaker at King Science Center School. 3 separate classes. (2002).
12. Speaker at Gretna Middle School. (December 2004)
13. 4-H leader since 2001.